Claims

1. Binder including an aqueous, film forming, polymeric siloxane.

2. Binder according to claim 1, characterized in that the polymeric siloxane has a content of alkoxy groups of less than 10 % by weight, preferably of less than 5 % by weight, particularly preferably of less than 2 % by weight based on the polymeric siloxane.

3. Binder according to claim 1 or 2, characterized in that the binder is produced from individuals or mixtures of the following group of silanes, comprising alkyl- or alkenyl silanes, methacrylic silanes and silanes which contain epoxy-, mercaptane- or hydroxyalkyl groups.

4. Binder according to at least one of the preceding claims, characterized in that the content of molymers in the binder is less than 10 % by weight, preferably less than 5 % by weight, particularly preferably less than 3 % by weight, advantageously less than 1 % by weight, each based on the overall solids-content of the binder.

5. Binder according to at least one of the preceding claims, characterized in that the binder liberates less than 10 % by weight, preferably less than 5 % by weight, particularly preferably less than 2 % by weight alcohols, each based on the overall amount of the binder.

6. Binder according to at least one of the preceding claims, characterized in that the binder is acid-free.

7. Binder according to at least one of the preceding claims, characterized in that it is a siloxane filled with particles.

8. Binder according to claim 7, characterized in that the particles have dimensions of smaller than 100 µm, preferably of up to 50 µm, particularly preferably up to 20 µm, advantageously up to 10 µm, particularly advantageously below 1 µm.

9. Binder according to claim 8, characterized in that the particles have dimensions below 1 µm, particularly advantageously between 5nm and 100 nm, preferably between 10 and 55 nm.

10. Binder according to claim 7, characterized in that in the binder inorganic particles, in particular silicon dioxide, are employed.

11. Binder according to claim 10, characterized in that colloidal silicon dioxide or particulate silicic acid are employed.

12. Binder according to claim 7, characterized in that the silicon dioxide has been added to the binder in the form of hydrogen-, lithium-, potassium or sodium polysilicate or as a mixture of the aforesaid polysilicates.

13. Binder according to any one of claim 7 to 12, characterized in that particles are employed which, in aqueous solution, have an acid pH-value.

14. Binder according to claim 7, characterized in that in the binder organic particles are employed.

15. Binder according to claim 7, characterized in that the monomeric silane employed in the manufacture of the binder and the particles are employed in a molar ratio of 50 to 1 up to 1 to 50, preferably of 20 to 1 up to 1 to 20, advantageously of 10 to 1 up to 1 to 10, particularly advantageously of 5 to 1 up to 1 to 5, particularly preferred of 2 to 1 up to 1 to 2.

16. Binder according to at least one of the preceding claims, characterized in that the object-temperature for final curing of the binder is in excess of room temperature, preferably above 40 °C, particularly preferred above 80 °C, advantageously above 150°C, very advantageously up to 300 °C, particularly advantageously up to 500 °C.

17. Binder according to at least one of the preceding claims, characterized in that the time for final curing of the binder amounts to 1 second and 90 minutes, advantageously between 2 minutes and 60 minutes, particularly preferred between 3 minutes and 30 minutes.

18. Means according to claim 1, characterized in that the polymeric siloxane has a molecular weight of at least 200 g/mol, preferably at least 400 g/mol, particularly preferably at least 800 g/mol, advantageously at least 1000 g/mol

19. Binder according to at least one of the preceding claims, characterized in that the solids content amounts to between 0.5 % and 90 %, advantageously more than 10 %, more than 25 %, particularly preferred more than 50 %, advantageously more than 70 %.

20. Binder according to at least one of the preceding claims, characterized in that the pH-value amounts to between 2 and 13, preferably between 3 and 8.

21. Binder according to at least one of the preceding claims, characterized in that co-binders in an amount of 0.01 % by weight up to 50 % by weight based on the overall formulation of the coating composition have been added, preferably from the group comprising alkyd resins, epoxy resins, acrylic dispersions, phenoxy resins, melamin resins, polyurethane resins and epoxy resins.

22. Binder according to claim 1, characterized in that the aqueous polymeric siloxane has added thereto an organic solvent in a proportion of up to 20 % by weight, preferably of up to 10 % by weight, each based on the overall formulation of the binder.

23. Coating composition for the coating of metal surfaces including a binder according to at least one of claims 1 to 20 and at least one further additive.

24. Coating composition according to claim 23, characterized in that the coating composition comprises a solids content of 0.5 % to 95 %, preferably of more than 1%, preferably of more than 20%, advantageously of more than 50%.

25. Coating composition according to at least one of the preceding claims, characterized in that the object temperature for final curing of the binder is above room temperature, preferably above 40 °C, particularly preferably above 80 °C, advantageously above 150 °C, very advantageously up to 300 °C, particularly advantageously up to 500 °C.

26. Coating composition according to at least one of the preceding claims, characterized in that the time for final curing of the binder amounts to between 1 second and 90 minutes, advantageously between 2 minutes and 60 minutes, particularly preferably between 3 minutes and 30 minutes.

27. Coating composition according to claim 23, characterized in that the coating composition, besides the binder, has added thereto at least one additive for adjusting the curing period, the substrate wetting and/or for adjusting the curing temperature and/or for adjusting the viscosity of the metal surface to be coated in an amount each of 0.01 weight % to 25 weight %, preferably of 0.1 weight % up to 10 weight % based on the overall formulation of the coating composition.

28. Coating composition according to claim 23, characterized in that, as additive, one or more substances have been employed from the group including water, alcohols, ketones, glycols, polyglycol, polypropylene glycol, glycol ethers, glycol ether esters, dipropylene glycol, methoxypropanol, butyl glycol, Texanol, aromatic and aliphatic hydrocarbons, and that this or these additives are employed in an amount of 0.01 % by weight up to 25 % by weight, preferably of 0.1 % by weight up to 15 % by weight, each based on the overall formulation of the coating composition.

29. Coating composition according to at least one of claims 23 to 28, characterized in that, as additive, waxes and/or lubricating agents have been added in an amount of 0.01 % to 40 % based on the overall formulation of the coating composition.

30. Coating composition according to claim 29, characterized in that, as waxes, preferably solid or liquid emulsions or dispersions, in particular polyethylene, polypropylene, polytetrafluoro ethylene, polyvinylidene fluoride or carnauba wax or mixtures of different waxes are employed.

31. Coating composition according to at least one of claims 23 to 30, characterized in that as additive catalysts or at least one additive for improving the rheology, the substrate wetting, the defoaming, the flow properties, the de-aeration, the pigment wetting, the flexibilization or as water capturing agent, have been added singly or in mixture in an amount each of 0.01 % by weight up to 20 % by weight, preferably 2 % by weight up to 8 % by weight, particularly preferably below 2 % by weight, advantageously below 1 % by weight, each based on the overall formulation of the coating composition.

32. Coating composition according to claim 31, characterized in that, as an additive for water capturing, a monomeric or oligomeric silane or a mixture of monomeric and/or oligomeric silane has been employed in

an amount of up to 2.8 % by weight, preferably up to 2 % by weight, particularly preferably up to 1 % by weight based on the overall formulation of the coating composition.

33. Coating composition according to at least one of claims 23 to 32, characterized in that, as additive, pigments, pigment paste, dyes and/or fillers are employed in an amount of 0.01 % up to 60 % based on the overall formulation of the coating composition.

34. Coating composition according to claim 33, characterized in that metal particles, in particular aluminum particles, are employed as pigments.

35. Coating composition according to at least one of claims 23 to 34, characterized in that the binder has added thereto as additive a corrosion inhibitor and/or a corrosion preventing or retarding pigment or a mixture of such additives in solid or liquid form, in particular an organic corrosion inhibitor, preferably an organic nitro compound, in particular a dinitrosalicilic acid in an amount of 0.01 % by weight up to 30 % by weight based on the overall formulation of the coating agent.

36. Coating composition according to at least one of claims 23 to 35, characterized in that to the binder are added as additive boron compounds, in particular from the group of boric acids or boron oxides or molybdenum or phosphorus compounds, each individually or in mixture.

37. Coating composition according to at least one of claims 23 to 36, characterized in that, as an additive, at least one particulate metal for the improvement of the corrosion properties of the metal surface to be coated, is added in an amount of from 10 weight % up to 95 weight %, preferably 20 weight % up to 80 weight %, preferably 20 weight % to 60 weight %, advantageously 20 weight % to 50 weight %, based on the overall formulation of the coating composition.

38. Coating composition according to claim 37, characterized in that, as particulate metal of the group containing zinc, aluminium, iron, manganese and tin, the particulate metals are employed each individually, in a mixture or as alloy of at least two metals of the group of zinc and aluminum, iron, manganese and tin or chromium-nickel-steel particles.

39. Coating composition according to claim 37, characterized in that the particulate metal is employed in the form of beads, spherical particles, lamellae or flakes.

40. Coating composition according to claim 37, characterized in that to the coating composition a solvent is added for the particulate metal, in particular an organic solvent, preferably ketones, methoxypropanol, butyl glycol, glycols, polyglycol, polypropylene glycol, glycol ether, glycol esters, glycol ether esters, dipropylene glycol, texanol, aliphatic and aromatic hydrocarbons, as well as alcohols or a mixture of the aforesaid organic solvents in an amount of 0.01 up to 35 weight %, based on the overall formulation of the coating composition.

41. Coating composition for the coating of metal surfaces including a component I, including
- at least one particulate metal
- an organic solvent for the particulate metal
- optionally a corrosion inhibitor for the particulate metal and one component II, including
- an aqueous, film forming, polymeric siloxane according to at least one of claims 1 to 23 as a binder.

42. Coating composition according to claim 41, characterized in that component I and/or component II has added thereto further additives.

43. Coating composition according to at least one of claims 23 to 40, characterized in that at least two components I and II of the coating composition are stored separately until used.

44. Work piece including a coating formed from a fully cured coating agent according to at least one of the claims 23 to 43.